

Abstract

We propose to perform a precise measurement of the neutral pion lifetime using the small angle coherent photoproduction of the π^0 in the Coulomb field of a heavy nucleus, i.e. the Primakoff effect. The $\pi^0 \rightarrow \gamma\gamma$ decay proceeds primarily via the chiral anomaly and represents one of the most definitive tests of low energy QCD. Presently, higher order corrections to the lifetime, including finite quark mass effects, remain largely untested by experiment. This measurement will be a state-of-the-art experimental determination of the lifetime with a precision of less than 2%, which is commensurate with the theoretical uncertainty. The improved precision is enabled by (1) the use of quasimonochromatic photons from the TJNAF Hall B tagged photon facility and (2), the development of a hybrid π^0 detector consisting of a multichannel lead glass detector with a high resolution insertion.